

Application Serial No. 10/625,287
Reply to Office Action of September 22, 2009

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Docket: CU-3301

Amendments To The Claims

The listing of claims presented below will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1. (previously presented) An impulsive type liquid crystal driving device, comprising:
a liquid crystal panel comprising:
a plurality of gate bus lines arranged in a first direction; and
a plurality of data bus lines arranged in a second direction
substantially perpendicular to the first direction;
a gate driver section for sequentially scanning the plurality of gate bus lines during an active address interval in response to a vertical starting signal, a vertical clock signal, and an output enable signal and for scanning the plurality of gate bus lines during a vertical blanking interval in a unit of a predetermined number of lines; and
a current boosting section for increasing current amount supplied to the gate bus lines during the vertical blanking interval in response to a pulse width modulation signal.
2. (currently amended) The liquid crystal driving device according to claim 1, wherein the active address interval is substantially equivalent to being driven at 85 Hz when a refresh rate is 60 Hz by substantially fixing a frame interval to 16.7 ms.
3. (previously presented) The liquid crystal driving device according to claim 1, wherein the gate driver section comprises a plurality of gate driver integrated circuits for scanning the plurality of gate bus lines in response to the vertical starting signal, the vertical clock signal, and the output enable signal.
4. (previously presented) The liquid crystal driving device according to claim 3, wherein each of the gate driver integrated circuit comprises:
a first shift register section which sequentially shifts the vertical starting

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signal and outputs the shifted vertical starting signal during the active address interval, and which generates a predetermined number of first output signals at substantially the same time the shifted vertical starting signal is outputted after receiving the vertical starting signal during the vertical blanking interval, in response to the vertical clock signal and the output enable signal;

a second shift register section which receives the signal shifted by the first shift register section, sequentially shifts the received signal, and then outputs shifted received signal during the active address interval, and which generates a predetermined number of second output signals at substantially the same time the shifted received signal is outputted after receiving the signal shifted by the first shift register section during the vertical blanking interval, in response to the vertical clock signal;

a plurality of level shifters which level-convert the output signals of the first and the second shift register section; and

a plurality of buffer which amplifiers which amplify the signals converted by the plurality of level shifters and which then generates gate on/off signals.

5. (previously presented) The liquid crystal driving device according to claim 4, wherein the first shift register section comprises:

a predetermined number of first switches which select either the vertical starting signal or an internally shifted signal in response to the output enable signal; and

a predetermined number of first shift registers which receive the vertical starting signal and then output it after sequentially shifting it, when the internally shifted signal is selected, and which receive the vertical starting signal and then output the predetermined number of first output signals at the same time without shifting, when the vertical starting signal is selected.

6. (previously presented) The liquid crystal driving device according to claim 4, wherein the second shift register section includes:

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a plurality of second switches which select either the signal shifted by the first shift register section or an internally shifted signal in response to the output enable signal; and

a predetermined number of second shift registers which receive the vertical starting signal and then output it after sequentially shifting it, when the internally shifted signal is selected, and which receive the shifted signal and then output the predetermined number of second output signals at the same time without shifting, when the signal shifted by the first shift register section is selected.

7. (Original) The liquid crystal driving device according to claim 1, wherein the current boosting section includes a plurality of current booster circuits for receiving a plurality of gate on/off signals outputted from the gate driver section and a pulse width modulation signal, respectively.

8. (Original) The liquid crystal driving device according to claim 7, wherein the current booster circuit includes:

an operational amplifier having a non-inverting terminal and an inverting terminal;
a first resistor coupled between the non-inverting terminal and a ground;

a first capacitor coupled in parallel to the first resistor;

a second capacitor coupled between a first input terminal and the ground; a
second resistor of which one end is coupled to the first input terminal;

a first bipolar transistor coupled between the other end of the second resistor and
a ground, and turned on according to an output signal of the operational amplifier;

a third resistor of which one end is coupled to the first input terminal;

a second bipolar transistor coupled between other end of the third resistor and
the non-inverting terminal, and turned on according to an output signal of other end of
the second resistor;

a fourth resistor coupled between the first input terminal and the non-inverting
terminal; a third capacitor coupled between the inverting terminal of the operational

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amplifier and an output terminal;

a fifth resistor coupled between a second input terminal and the inverting terminal;

a sixth resistor coupled between the inverting terminal and a ground; and a fourth capacitor coupled in parallel to the sixth resistor.

9. (Original) The liquid crystal driving device according to claim 8, wherein the first and the second first bipolar transistor are p-type transistors.

10. (Original) The liquid crystal driving device according to claim 1, wherein the current amount generated in the current boosting section is adjusted according to a duty ratio of the pulse width modulation signal.